

Taking Charge

Jay Schecker

1663: We often hear about the need to conserve energy or to find alternative energy sources but rarely about the need to store it. Why does the DOE consider electrical energy storage "crucial" to our secure energy future?

Thorn: The answer is really that the world uses about 17 trillion joules of energy per second, and that rate is likely to double by 2050. We're going to need energy and lots of it. Simply burning more coal and oil isn't a solution, partly because oil supplies are dwindling, but mostly because the carbon dioxide that's emitted when you use those sources drives global climate change. To meet the impending energy need, we'll have to ramp up the use of carbon-free energy sources such as nuclear, wind, and solar.

Electrical energy storage comes into play because wind and solar generate electricity intermittently—we can't control when or how much they supply. Now Albert will tell you that because of the conservation of energy, the electrical supply must always meet the instantaneous demand. If it doesn't, even for just a few seconds, large portions of the power grid can go down. So by increasing the use of wind and solar power, we introduce a degree of uncertainty into our electric supply and actually make the grid less stable. Electrical energy storage lets you save electricity for later use, so it mitigates wind and solar's inherent variability. It enables the expansion of those two energy sources, since now they can be added to the grid without de-stabilizing it.

Migliori: Consider how New Mexico's public utility, PNM, sees it. Suppose the wind really kicks up in the dead of night, when the demand for electricity is low and is already being met. They can't put that electricity on the grid, so if there's no place to store it, they have to shut the wind turbines down. Not only is that a waste of a capital investment, but the wind farm is idle when it could be making more power than a coal-fired power plant.

Conversely, in Albuquerque at about 4 p.m. during the summer, many air conditioners come on as people get home from work and PNM has to deal with a huge surge in electric usage. Solar power would help, but the sun is waning, so you're well off the peak for generating solar electricity. Unfortunately, in New Mexico, the strong winds blow in the spring at night, not in the summer in the afternoon, so the wind farm doesn't help meet that demand either. With storage, you can collect solar energy during the day and then use it at night or store the spring winds and offset the summer's air conditioning energy needs.